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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,562	03/14/2001	Hillel Hendler	23600.01901	5863
58076	7590	02/22/2007		
REED SMITH, LLP TWO EMBARCADERO CENTER SUITE 2000 SAN FRANCISCO, CA 94111			EXAMINER NG, CHRISTINE Y	
			ART UNIT	PAPER NUMBER
			2616	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.		Applicant(s)	
	09/809,562		HENDLER, HILLEL	
	Examiner		Art Unit	
	Christine Ng		2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-5, 7-15, 17-20 and 30-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18 and 19 is/are allowed.
- 6) ☒ Claim(s) 2-5, 7-15, 17, 20 and 30-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 32, 2, 4 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,859,874 to Wiedeman et al.

Referring to claim 32, Scott discloses in Figure 2 a communication method comprising the steps:

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Receiving (at antennas 130,131) multiple signals (antenna signals 140,141).

Refer to Column 3, lines 51-55.

Multiplexing (at summer 151) the signals (antenna signals 140,141). Refer to Column 4, lines 34-35.

Transporting the multiplexed signals through a single chain (backhaul cable 152). Refer to Column 4, lines 35-37.

Demultiplexing (at splitter 160) the signals (antenna signals 140,141). Refer to Column 4, lines 50-52.

Using each of demultiplexed signals (antenna signals 166,167) in a related application (antenna diversity). Refer to Column 4, line 66 to Column 5, line 12 and Column 8, line 32 to Column 9, line 10.

Wherein the step of multiplexing comprises sampling the multiple signals at a sampling rate greater than $n \cdot F_s$ wherein n is the number of signals (2), F_s is the Nyquist sampling rate for a single signal. Each antenna signal 140,141 may be periodically sampled using A/D sampling at a rate corresponding to at least twice the bandwidth of the received signal (Nyquist sampling rate). The Nyquist sampling rate states that the sampling frequency of a signal should be greater than twice the signal bandwidth. Furthermore, since there are two signals at antennae 140,141 and each antenna signal is sampled, the total sampling rate will be $n \cdot F_s$. Refer to Column 13, lines 47-50.

Scott does not disclose filtering the received signals at a rejection filter, and where F_s is at least twice a bandwidth of the rejection filter.

Wiedeman et al disclose in Figure 2 a receiver 7r with bandpass filters 20-1 to 20-n of bandwidth B_i . A minimum Nyquist sampling rate is two times B_i , which is twice the bandwidth B_i of the rejection filters 20-1 to 20-n. Refer to Column 8, lines 20-25; and Column 11, lines 15-19. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include filtering the received signals at a rejection filter, and where F_s is at least twice a bandwidth of the rejection filter. One would have been motivated to do so since sampling at the Nyquist sampling rate avoids the problem of aliasing and interference between samples and ensures that all signals are sampled often enough. Filtering the signals at a bandpass filter also ensures that only the signals within a certain frequency band will be received.

Referring to claim 2, Scott discloses in Figure 2 that the step of receiving comprises receiving each of the multiple signals (antenna signals 140,141) on a separate antenna (antennas 130,131). Refer to Column 3, lines 51-55.

Referring to claim 4, Scott discloses in Figure 2 that the multiple signals (antenna signals 140,141) are RF signals. Refer to Column 3, lines 33-36.

Referring to claim 10, Scott discloses in Figure 2 that the step of using comprises using the demultiplexed signals (antenna signals 166,167) in an antenna diversity application. Refer to Column 8, line 32 to Column 9, line 10.

Referring to claim 11, Scott discloses in Figure 2 that:

The method further comprises a step of downconverting the multiplexed signals (antenna signals 130,131) to a baseband signal. Refer to Column 4, lines 37-49.

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The step of demultiplexing (at splitter 160) comprises demultiplexing the downconverted baseband signal. Refer to Column 4, lines 50-52.

The step of using comprises using the demultiplexed signals (antenna signals 166,167) in an antenna diversity application. Refer to Column 8, line 32 to Column 9, line 10.

Referring to claim 12, Scott discloses in Figure 2 that the step of using comprises using the demultiplexed signals (antenna signals 166,167) in separate applications. The antenna providing the stronger signal may be used for communication until the signal quality deteriorates. Refer to Column 8, line 32 to Column 9, line 10.

Referring to claim 13, Scott discloses in Figure 2 that the step of transmitting the multiple signals (antenna signals 140,141) from separate sources. Refer to Column 3, lines 51-55.

Referring to claim 14, refer to the rejections of claims 11 and 12.

Referring to claim 15, refer to the rejection of claim 13.

4. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,859,874 to Wiedeman et al, and in further view of U.S Patent No. 6,411,824 to Eidson.

Referring to claim 3, Scott does not disclose multiplexing the multiple signals using an SPDT switch.

Eidson discloses in Figure 9 a combiner that performs antenna diversity, which comprises a SPDT switch 920. The combiner computes the amplitudes of the incoming signals from antennas 910 and 912 and then the comparator 918 selects the larger of

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the two amplitudes and directs the SPDT switch 920 to select the input corresponding to the largest amplitude. Refer to Column 15, lines 21-61. The SPDT switch allows each antenna 910 and 912 to be assigned a pole of the SPDT switch so that the SPDT switch can change from one antenna to another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include multiplexing the multiple signals using an SPDT switch, the motivation being that a SPDT switch can be turned on in two positions which allows it to switch on a separate antenna when in a certain position, thereby allowing two antennas to be used alternatively depending on their signal quality.

Referring to claim 5, refer to the rejection of claims 2, 3 and 4.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,859,874 to Wiedeman et al, and in further view of U.S. Patent No. 5,418,452 to Pyle.

Scott does not disclose that F_s is the Nyquist sampling rate of a highest bandwidth of the multiple signals.

Pyle discloses in Figure 1 a multiplexer 18 that multiplexes 8 signals 16A-16H. The clock signal on line 30 must satisfy the Nyquist sampling criterion for sampling. Specifically, the frequency of the clock signal on line 30 must be at least 16 times as high as the transition rate for the fastest input line 16, since MUX 18 has 8 inputs and each signal must be sampled at least twice as fast as its transition rate. Refer to Column 2, lines 24-41 and Column 4, lines 37-52. Pyle also discloses another example in Figure 4 of MUXes 50 and 56. The fastest signal input into MUX 50 has a frequency

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of 1 kHz, so the sampling signal on clock input 56 must have a frequency of at least 16 kHz. The fastest signal input into MUX 45 has a frequency of 2 kHz, so the sampling signal on clock input 46 must have a frequency of at least 32 kHz. Refer to Column 5, line 44 to Column 6, line 5. In all of these cases, the MUX samples the signals at $n \cdot F_s$, where F_s is the Nyquist sampling rate of the fastest signal and n is the number of signals (8). The MUXes are controlled by clock signals to sample the n signals at $n \cdot F_s$, where F_s is the frequency of the fastest signal. The fastest signal has the greatest bandwidth. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that F_s is the Nyquist sampling rate of a highest bandwidth of the multiple signals; the motivation being since the fastest signal occupies the largest bandwidth, a Nyquist sampling rate of the fastest signal will also be the Nyquist sampling rate for all other slower signals, thereby fulfilling the Nyquist criterion.

6. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,859,874 to Wiedeman et al, and in view of U.S. Patent No. 6,701,141 to Lam.

Referring to claim 8, Scott does not disclose that the step of using comprises using the demultiplexed signals in a beam forming application.

Lam discloses in Figure 2 an IF beamformer that uses demultiplexed signals from an analog splitter 204 in a beam forming application, where each subarray 208 performs beam forming for its received signals by adjusting the phase of each of the received signals. Refer to Column 4, line 57 to Column 5, line 21. A beam forming

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network adjusts the phase or amplitude of received signals to form a desired beam towards a particular direction. Refer to Column 1, lines 12-20. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the step of using comprises using the demultiplexed signals in a beam forming application, the motivation being that beam forming prevents multi-path transmissions and allows coherent transmission and reception of signals by directing signals in a desired direction.

Referring to claim 9, refer to the rejection of claim 11 and claim 8.

7. Claims 31, 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 6,275,484 to Lynch, and in further view of U.S. Patent No. 5,859,874 to Wiedeman et al.

Referring to claim 31, Scott discloses in Figure 2 a communication receiver comprising:

A switch (Figure 2) comprising:

At least two inputs, each input configured to be coupled to at least two signal carrying devices (antennas 130,131). Refer to Column 3, lines 51-55.

A switching mechanism (summer 151) configured to multiplex signals (antenna signals 140,141) received at said inputs. Refer to Column 4, lines 34-35.

An output (backhaul cable 152) configured to carry the multiplexed signal (from summer 151). Refer to Column 4, lines 35-37.

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A downconverter (not shown) comprising an input coupled to the output of the switch (summer 151) and configured to downconvert the multiplexed signal (from summer 151). Refer to Column 4, lines 37-49.

A signal processor (splitter 160) comprising an input coupled to receive the downconverted multiplexed signal (from summer 151) and an output (demultiplexed signals 166,167). Refer to Column 4, lines 50-61.

Wherein the signal processor (splitter 160) is configured to provide, at the signal processor (splitter 160) output, a data signal (demultiplexed signals 166,167) substantially corresponding to data contained in a communication signal carried by the signal carrying devices (antennas 130,131). Refer to Column 4, lines 50-61.

The switch operates at a frequency which is at least twice a Nyquist required sampling rate for a bandwidth of the communication signal. Refer to Column 13, lines 47-50.

Scott does not disclose a first Low Noise Amplifier (LNA) coupled to a first Band Pass Filter (BPF) and configured to provide a first signal to a first of the switch inputs; and a second LNA coupled to a second BPF and configured to provide a second signal to a second of the switch inputs;

Lynch et al discloses in Figure 1 a system in which two antennae 20 and 24 receive signals and feed the corresponding signals into bandpass filters 26 and 28. The bandpass filters 26 and 28 restrict the frequency range of the signals and pass the inputs to low noise amplifiers 30 and 32. The LNA's 30 and 32 provide an amplified output to mixers 34 and 36. Refer to Column 3, lines 12-21. Therefore, it would have

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been obvious to one of ordinary skill in the art at the time the invention was made to include a first Low Noise Amplifier (LNA) coupled to a first Band Pass Filter (BPF) and configured to provide a first signal to a first of the switch inputs; and a second LNA coupled to a second BPF and configured to provide a second signal to a second of the switch inputs. One would have been motivated to do so since bandpass signals ensure that only the signals within a certain frequency band are received, and amplifiers increase the energy of the signal for better reception.

Scott also does not disclose that the switch frequency comprises a sampling rate of at least twice a bandwidth of the BPFs.

Wiedeman et al disclose in Figure 2 a receiver 7r with bandpass filters 20-1 to 20-n of bandwidth B_i . A minimum Nyquist sampling rate is two times B_i , which is twice the bandwidth B_i of the rejection filters 20-1 to 20-n. Refer to Column 8, lines 20-25; and Column 11, lines 15-19. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the switch frequency comprises a sampling rate of at least twice a bandwidth of the BPFs. One would have been motivated to do so since sampling at the Nyquist sampling rate avoids the problem of aliasing and interference between samples and ensures that all signals are sampled often enough.

Referring to claim 17, Scott discloses in Figure 2 that the communication receiver (Figure 2) is a wireless communication receiver and the signal carrying devices are antennas (antennas 130,131). Refer to Column 3, lines 33-36 and lines 51-59.

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Referring to claim 20, Scott discloses in Figure 2 the communication receiver, wherein:

The communication signal (RF signal 113) comprises a plurality of communication signals (to each antenna 130,131). Refer to Column 3, lines 33-36.

Each antenna (antennas 130,131) of the at least two antennas (antennas 130,131) is configured to receive one of the plurality of communication signals. Refer to Column 3, lines 51-55.

The signal processor (splitter 160) comprises at least two demodulators (filter/correlator 170,172 and 171,173) each configured to receive one of the at least two digital signals each corresponding to a digital representation of a portion of a communication signal (RF signal 113) of the plurality of communication signals received by one of the at least two antennas (antennas 130,131). Refer to Column 4, line 66 to Column 5, line 12 and Column 8, lines 55-59.

Each of the at least two demodulators (filter/correlator 170,172 and 171,173) are configured to provide a data signal corresponding to a signal substantially corresponding to data contained in the communication signal (RF signal 113) of the plurality of communication signals. Refer to Column 4, line 66 to Column 5, line 12.

8. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 6,275,484 to Lynch in view of U.S. Patent No. 5,859,874 to Wiedeman et al, and in further view of U.S Patent No. 6,411,824 to Eidson. Refer to the rejection of claim 3.

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9. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,859,874 to Wiedeman et al in view of U.S. Patent No. 6,275,484 to Lynch in view of U.S Patent No. 6,411,824 to Eidson, and in further view of U.S. Patent No. 5,039,667 to Andricos.

Scott does not disclose:

Amplifying the received signals using a set of LNA's. Refer to the Lynch et al rejection part of claim 31.

Wherein the step of multiplexing is performed using a single pull double throw switch. Refer to the rejection of claim 3.

Scott also does not disclose that the SPDT and LNAs are integrated on a single active chip.

Andricos disclose in Figure 7 a system in which a LNA 737 and a SPDT switch 706 are integrated on a single chip #2. Refer to Column 16, lines 23-48. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the SPDT and LNAs are integrated on a single active chip. One would have been motivated to do so in order to simplify the system.

Allowable Subject Matter

10. Claims 18 and 19 are allowed.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Ng whose telephone number is (571) 272-3124. The examiner can normally be reached on M-F; 8:00 am - 5:00 pm.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

February 19, 2007

C. Ng *o*


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